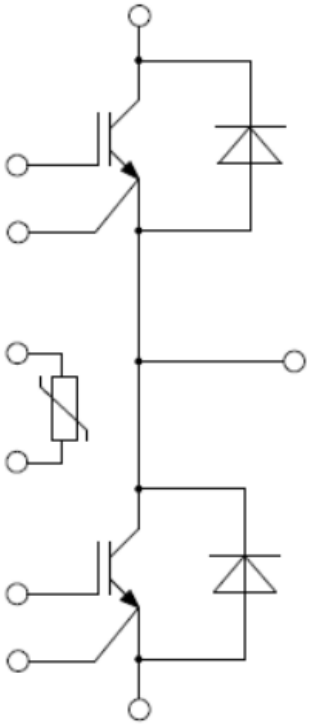
1200V，450A IGBT Module

■ 特点/Features

- 低 Vcesat/ Low Vcesat
- 高可靠性和功率密度/High reliability and Power density
- 低开关损耗/Low switching loss

■ 应用领域/Applications

- UPS 系统/UPS Systems
- 风力发电机/Wind Tuebines
- 电机传动/Motor Drives



Vces=1200V

Ic nom =450A

● IGBT-逆变器/IGBT- Inverter

最大额定值/Absolute Max Ratings

符号 Symbol	参数 Parameter	条件 condition	值 Value	单位 Units
V_{CES}	Collector-to-Emitter Voltage 集电极－发射极电压	T_{vj}=25 ℃	1200	V
$I_{C\ nom}$	Continuous DC collector current 连续集电极直流电流	Tc = 100°C,$T_{vj\ max}$=175 ℃	450	A
I_{CRM}	Repetitive peak collector current 集电极重复峰值电流	t_p=1ms	900	A
P_{total}	Total power dissipation 总功率损耗	Tc = 25°C,$T_{vj\ max}$=175 ℃	2150	W
V_{GES}	Gate-Emitter peak voltage 栅极－发射极峰值电压		+/- 20	V

特征值/Characteristics Values

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value值			单位 Units
			Min. 最小	Typ. 典型	Max. 最大	
$V_{CE(sat)}$	Collector-Emitter Saturation voltage 集电极－发射极饱和电压	V_{GE}=15V, I_C=450A,T_{vj}=25°C	—	1.75	—	V
		V_{GE}=15V, I_C=450A,T_{vj}=150°C	—	2.05	—	V
$V_{GE(th)}$	Gate threshold voltage 门极开启阀值电压	V_{GE}= V_{CE}, I_c = 17mA	5	5.6	6.2	V
C_{iss}	Input capacitance 输入电容	V_{GE} = 0V V_{CE}= 25V T_{vj}=25°C f = 1MHz	—	30.5	—	nF
C_{oss}	Output capacitance 输出电容		—	2.75	—	nF
C_{rss}	Reverse transfer capacitance 反向传输电容		—	1.0	—	nF
Q_g	Total gate charge 栅极电荷	V_{GE} = -15.....+15V	—	1.62	—	uC
R_g	Internal gate resistor 内部栅极电阻	T_{vj}=25°C	—	2.30	—	Ω
I_{CES}	Collector-Emitter leakage current 集电极-发射极截止电流	V_{CE}=1200V, V_{GE} = 0V,T_{vj}=25°C	-	-	5.0	mA
I_{GES}	Gate-Emitter leakage current 栅极-发射极漏电流	V_{CE}=0V, V_{GE} =20V,T_{vj}=25°C	-	-	500	nA
$T_{d(on)}$	Turn-On DelayTime 开通延迟时间	T_{vj}=25°C,V_{CE}=600V, Ic=450A,Rg=1.0ohm, V_{GE}=±15V	-	180	-	ns
Tr	Rise Time 上升时间		-	59	-	ns

$T_{d(off)}$	Turn-Off DelayTime 关断延迟时间		-	435	-	ns
T_f	Turn-Off Fall Time 下降时间		-	82	-	ns
$T_{d(on)}$	Turn-On DelayTime 开通延迟时间	T_{vj}=150°C,V_{CE}=600V, Ic=450A,Rg=1.0ohm, V_{GE}=±15V	-	187	-	ns
Tr	Rise Time 上升时间		-	66	-	ns
$T_{d(off)}$	Turn-Off DelayTime 关断延迟时间		-	504	-	ns
T_f	Turn-Off Fall Time 下降时间		-	218	-	ns
E_{on}	Turn-on switch loss 开通损耗	T_{vj}=25°C,V_{CE}=600V, Ic=450A,Rg=1.0ohm, V_{GE}=±15V	-	21	-	mJ
E_{off}	Turn-off switch loss 关断损耗		-	43	-	mJ
E_{on}	Turn-on switch loss 开通损耗	T_{vj}=150°C,V_{CE}=600V, Ic=450A,Rg=1.0ohm, V_{GE}=±15V	-	36	-	mJ
E_{off}	Turn-off switch loss 关断损耗		-	51	-	mJ
I_{SC}	Short- circuit current 短路电流	T_{vj}=150°C,V_{GE}=15V, V_{CE}=800V, t_{P}≤10us	-	2000	-	A
R_{thJC}	Junction-Case Thermal resistance 结－外壳热阻	-	-	-	0.07	K/W
$T_{vj\ op}$	Temperature under switching 在开关状态下温度	-	-40	-	150	°C

● 二极管-逆变器/Diode- Inverter

最大额定值/Absolute Max Ratings

符号 Symbol	参数 Parameter	条件 condition	值 Value	单位 Units
V_{RRM}	Repetitive peak reversevoltage 反向重复峰值电压	T_{vj}=25 °C	1200	V
I_F	Continuous DC forward current 连续正向直流电流		450	A
I_{FRM}	Repetitive peak forward current 正向重复峰值电流	T_p=1ms	900	A

特征值/Characteristics Values

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value值			单位 Units
			Min. 最小	Typ. 典型	Max. 最大	
V_F	Forward voltage 正向电压	I_F=450A,T_{vj}=25 °C	-	2.32	-	V
		I_F=450A,T_{vj}=150 °C	-	2.40	-	V
I_{RM}	Peak reverse recovery current 反向恢复峰值电流	I_F=450A,V_R=600V, T_{vj}=25 °C	-	243	-	A
Q_r	Recovery charge 恢复电荷		-	21	-	uC
E_{rec}	Reverse recovery energy 反向恢复损耗		-	11	-	mJ
I_{RM}	Peak reverse recovery current 反向恢复峰值电流	I_F=450A,V_R=600V, T_{vj}=150 °C	-	318	-	A
Q_r	Recovery charge 恢复电荷		-	53	-	uC
E_{rec}	Reverse recovery energy 反向恢复损耗		-	24	-	mJ
R_{ThJC}	Junction-Case Thermal resistance 结一外壳热阻		-	-	0.05	K/W
$T_{VJ\ OP}$	Temperature under switching 在开关状态下温度		-40	-	150	°C

● 负温度系数热敏电阻/ NTC- Thermistor

特征值/Characteristics Values

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value值			单位 Units
			Min. 最小	Typ. 典型	Max. 最大	
R_{25}	Rated Resistance 额定电阻值	T_C= 25 °C		5.0		kΩ
ΔR/R	Deviation for R100 R100 偏差	T_C= 25 °C,R100=493Ω	-5	-	5	%
P_{25}	Power dissipation 耗散功率	T_C= 25 °C	-	20	-	mW
$B_{25/50}$	B-value B-值	R_2=R_{25}exp[$B_{25/50}$ (1/T2-1/(298,15K))]	-	3375	-	K

● 模块/Module

模块参数/Module parameter

符号 Symbol	参数 Parameter	测试条件 Test conditions	Value值			单位 Units
			Min. 最小	Typ. 典型	Max. 最大	
V_{ISOL}	Isolation voltage 绝缘测试电压	RMS,f=50Hz,t=1min	-	2.5	-	kV
	Material of Base plate 模块基板材料		-	Cu	-	
	Internal Isolation 内部绝缘	Basic insulation (class1,IEC61140)	-	Al_2O_3	-	
R_{thCH}	Junction to heatsink, Thermal Resistance 外壳－散热器热阻		-	0.009	-	K/W
$L_{s\ CE}$	Stray induction module 杂散电感,模块		-	25	-	nH
$R_{CC'+EE'}$	Module lead resistance 模块引线电阻,端子-芯片	T_C= 25 °C	-	1.5	-	mΩ
T_{STG}	Storage Temperature 储存温度		-40	-	+150	°C
M	Mounting torque for modul mounting 模块安装的安装扭距	Mounting to heat sink M5	3.0	-	6.0	Nm
	Terminal connection torque 端子联接扭距	Main Terminal M6	3.0	-	6.0	Nm
G	Weigh 重量		-	350	-	g

● 特征曲线/ Characteristic Curve

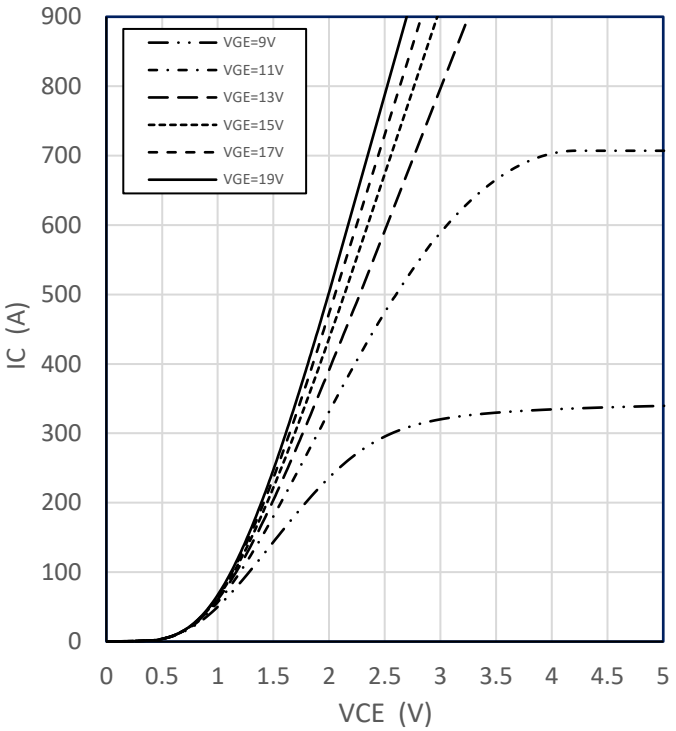


图 1：输出特性@150℃/ Typical Output Characteristic @150℃

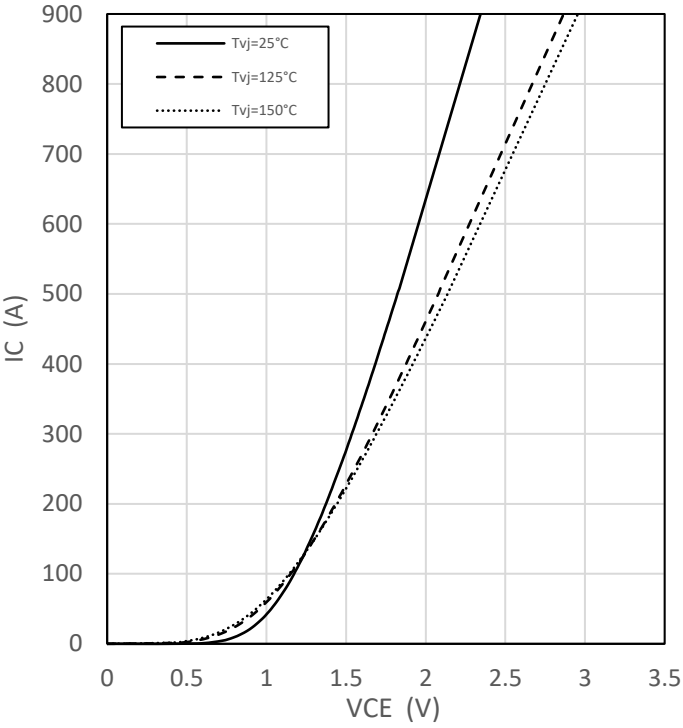


图 2：输出特性@/ Typical Output Characteristic

Vcc=600V, Ic=450A, Vge±15V, Rg=1.0Ω

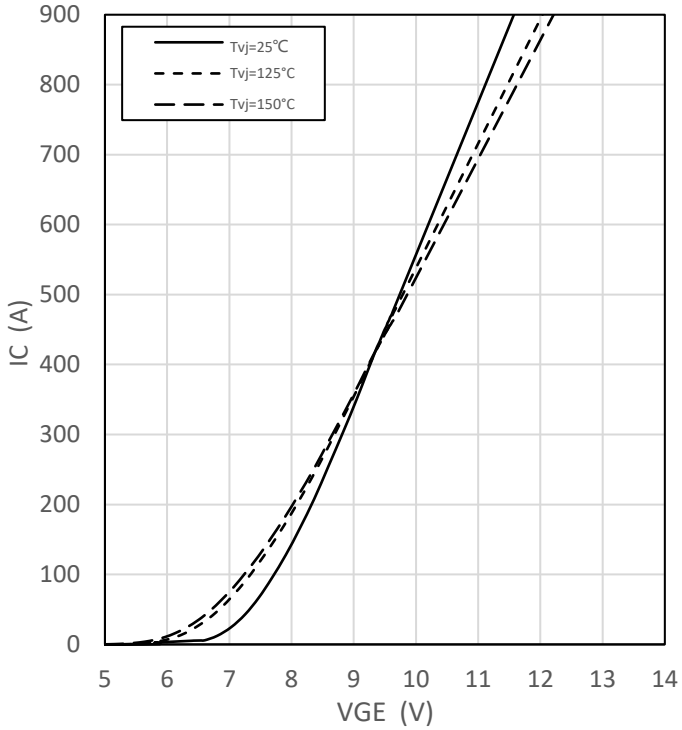


图 3：传输特性/ Transfer Characteristic

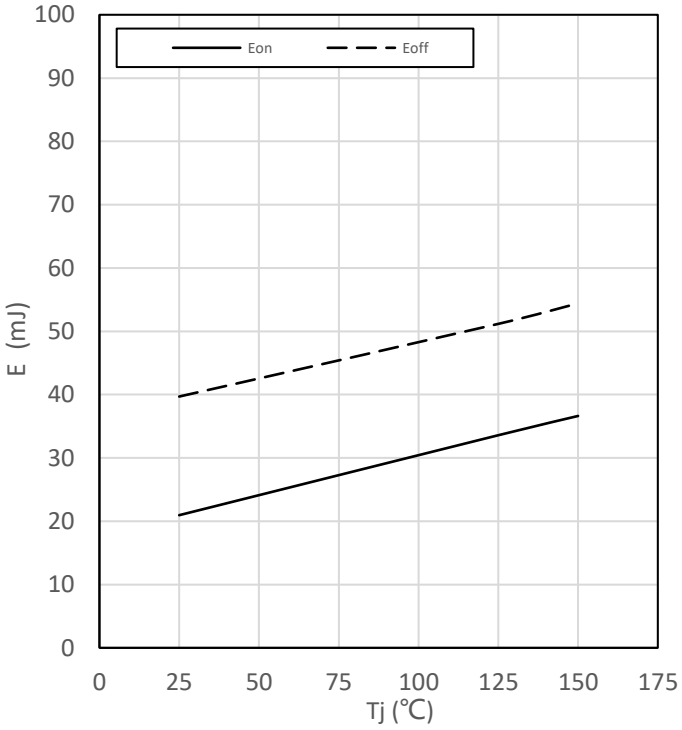


图 4：动态损耗-温度特性/Typical switching losses as T_j

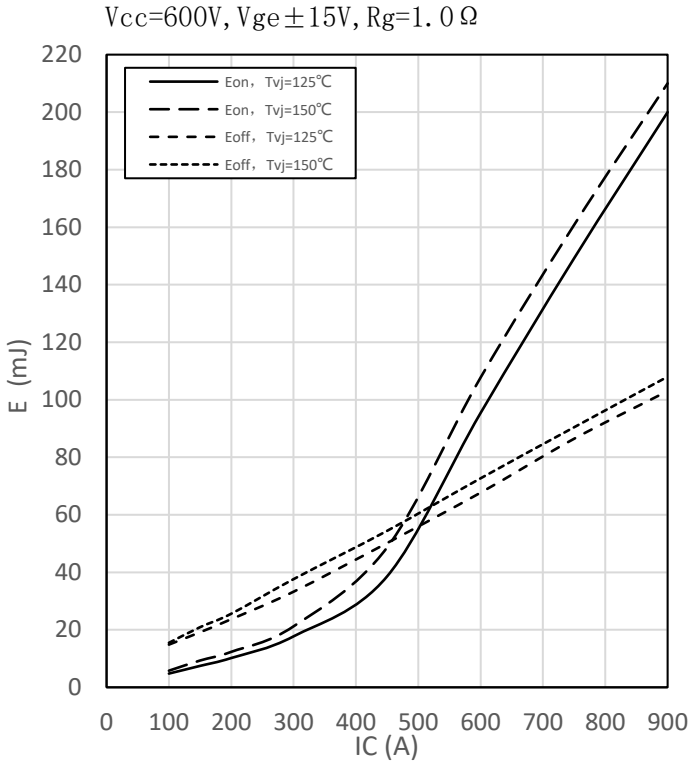


图 5：动态损耗-电流特性/Typical switching losses as I_C

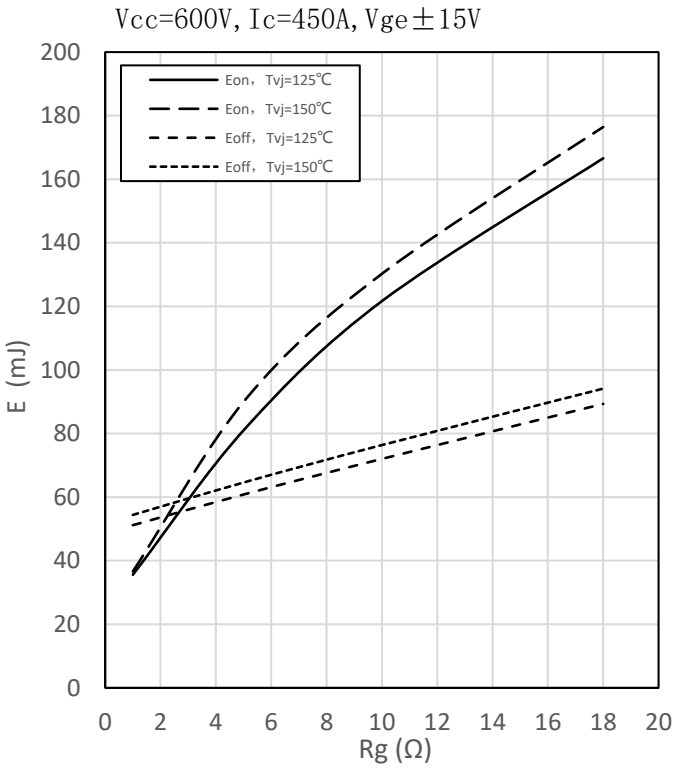


图 6：动态损耗-门极电阻特性/Typical switching losses as R_G

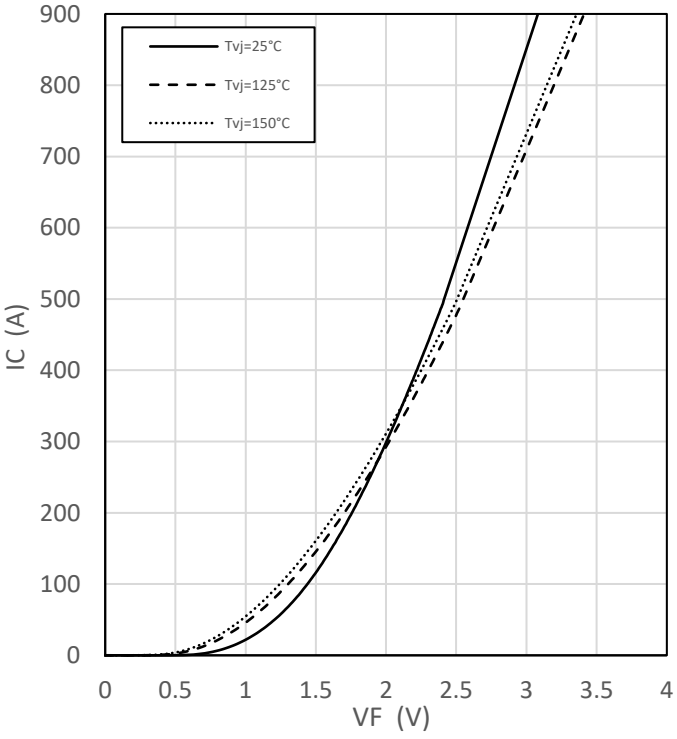


图 7：二极管压降/Typical I_F as a function of V_F

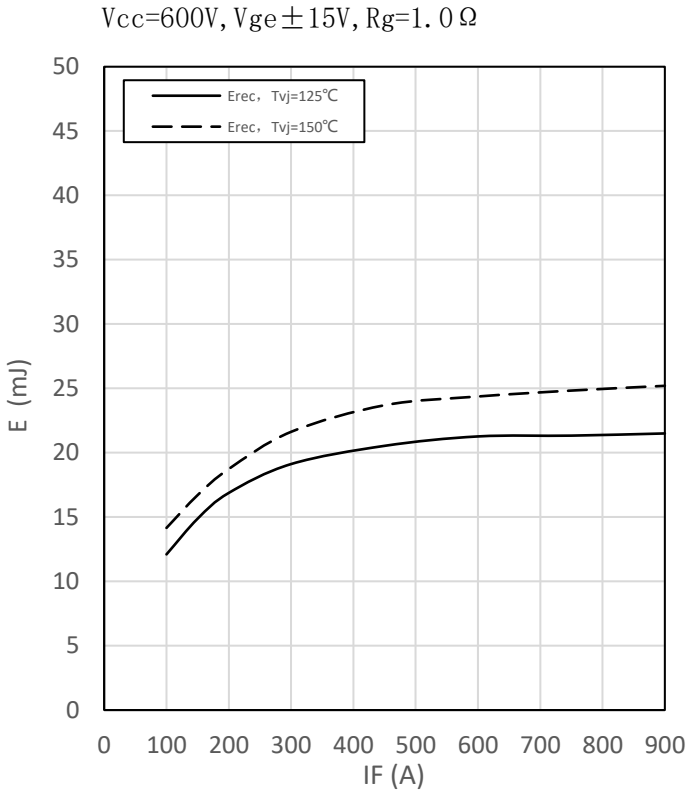


图 8：反向恢复损耗-电流/Typical E_{REC} as a function of Ic

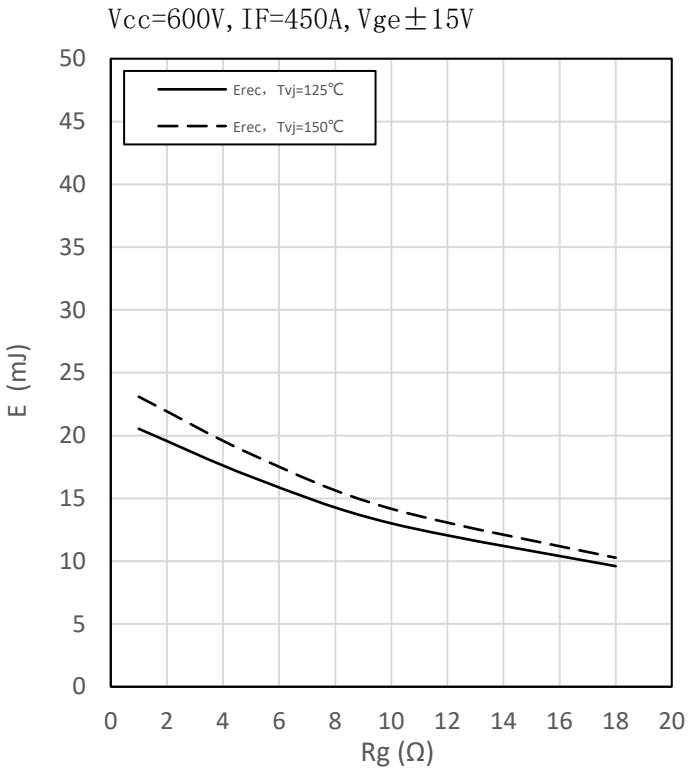


图 9：反向恢复损耗-门极电阻特性/Typical EREC as a function of Rg

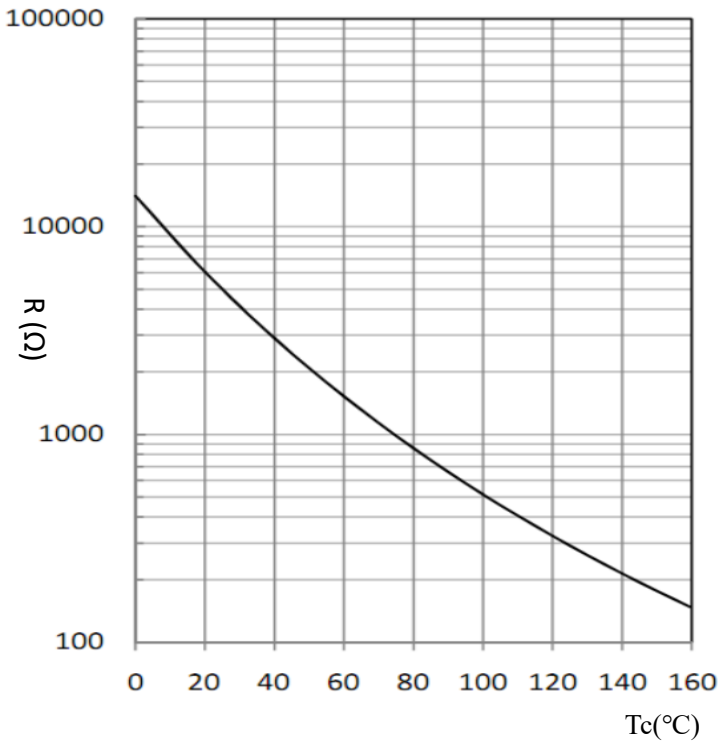


图 10：热敏电阻特性/NTC Temperature Characteristic

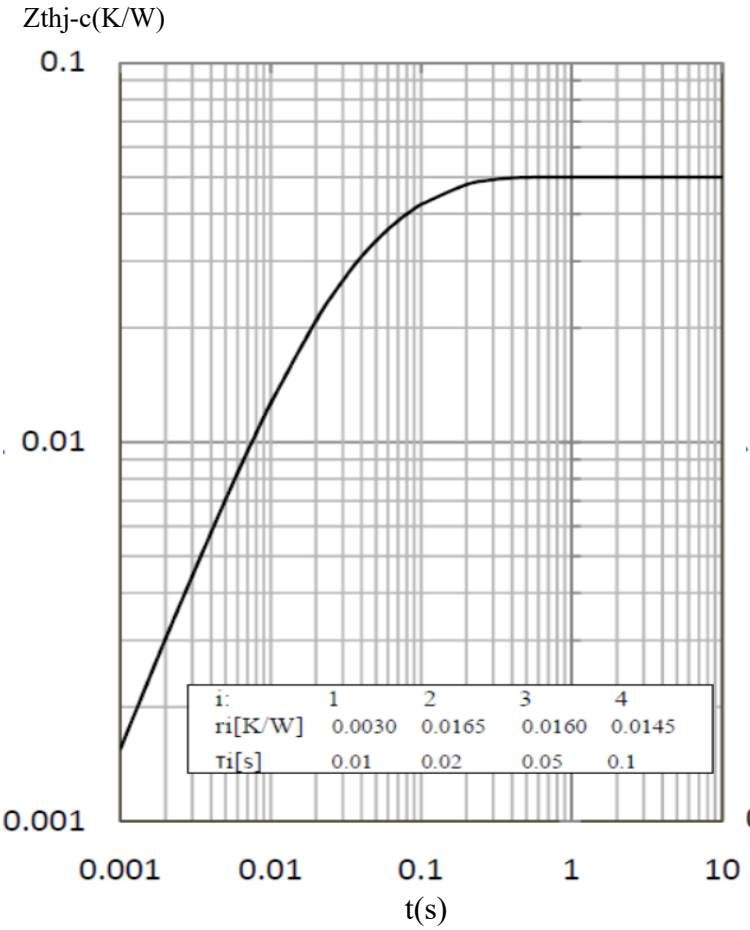


图 11：IGBT 瞬态热阻抗/IGBT Transient Thermal Impedance

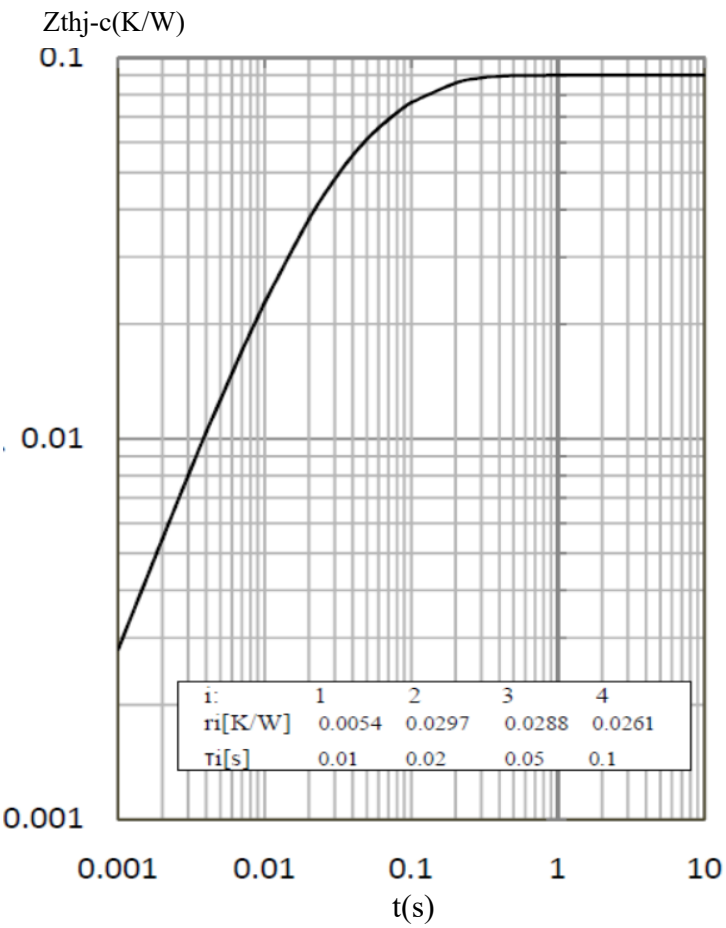
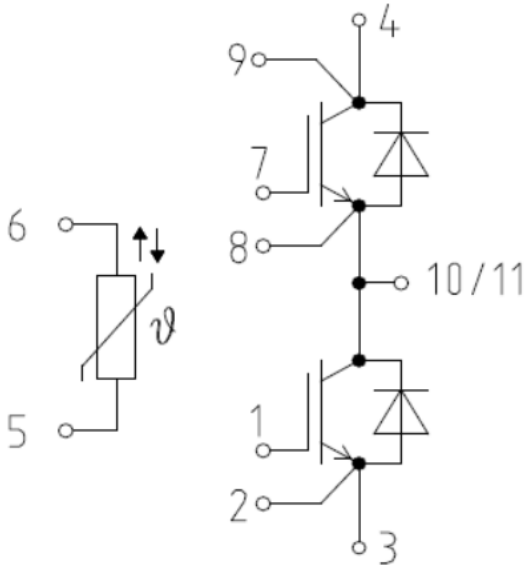
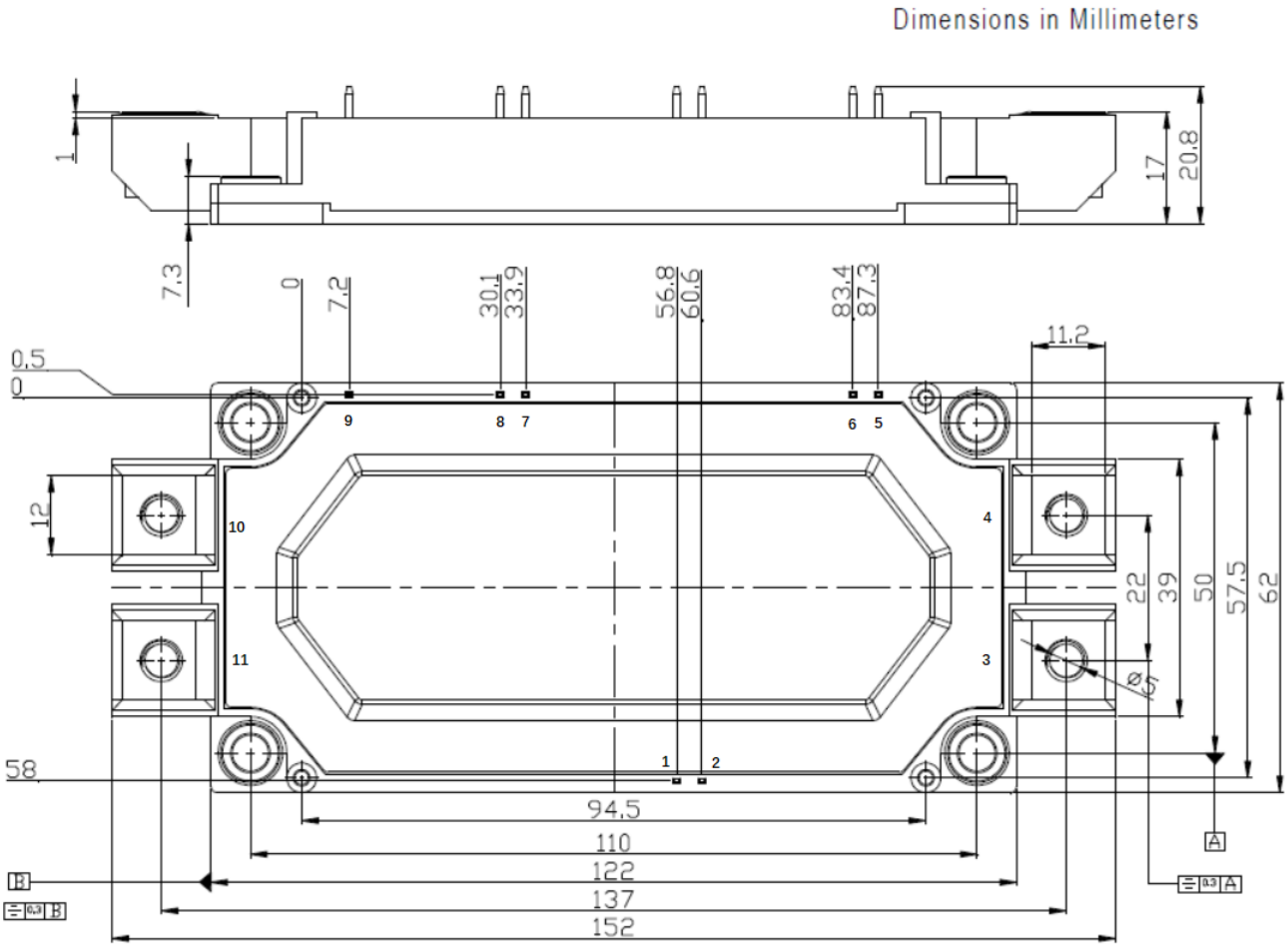


图 12：二极管瞬态热阻抗/Diode Transient Thermal Impedance

- **接线图/Circuit diagram headline**



- **封装尺寸/Package Dimensions**



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